IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#22

In re Application of Shipeng Li	:	Docket No.: SAR 13076
Serial No. 09/312,797	:	Group Art Unit: 2613
Filed: May 17, 1999	:	Examiner: Y. Young Lee
For: METHOD AND APPARATUS FOR GENERIC SCALABLE SHAPE CODING	:	

BRIEF ON APPEAL

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

The following Appeal Brief is submitted pursuant the Notice of Appeal filed August 19, 2002 and received by the Patent Office on August 27, 2002 in the above-identified application.

REAL PARTY IN INTEREST

The real parties in interest are the Sarnoff Corporation and Sharp Corporation.

RELATED APPEALS AND INTERFERENCES

No other appeals or interferences that directly affect, or are directly affected by, or have a bearing on the Board's decision in the pending appeal are known to the Appellant, Appellant's legal counsel, or the Assignees.

STATUS OF CLAIMS

Claims 1-30 are pending in the application.

Claims 1-3 and 27-30 stand under final rejection, from which rejection this appeal is taken. Claims 4-26 were withdrawn from further consideration pursuant to 37 C.F.R. § 1.142(b) as being drawn to a nonelected embodiment (an election was made without traverse). However, in accordance with Appellant's response to the Restriction Requirement dated April 2, 2002, claims 1, 27 and 29 are generic to all species. As such, if the Board determines that the generic

claims are allowable, then it is respectfully requested that claims 4-26 be allowed for at least the same reason.

STATUS OF AMENDMENTS

In response to a restriction requirement dated March 1, 2001, Appellant elected a species of the invention embodied in claims 1-3 and 27-30.

A Response, in accordance with 37 C.F.R. § 1.111, was filed on July 1, 2001 in response to a non-final Office Action dated April 27, 2001. The Response amended claims 27 and 29.

A Response, in accordance with 37 C.F.R. § 1.116, was filed on October 19, 2001 in response to a final Office Action dated August 10, 2001. In the final Office Action, the Examiner considered the Appellant's arguments, but reiterated his rejection of claims 1, 2 and 27-30 and objection to claim 3 for depending from a rejected claim. The Response amended claims 1, 27, and 29.

An Advisory Action was mailed on October 25, 2001. The Examiner indicated that Appellant's proposed amendment raised new issues that would require further consideration and/or search.

Appellant filed, on November 9, 2001, a request for Continued Prosecution Application ("CPA") under 37 C.F.R. § 1.53(d).

A Response, in accordance with 37 C.F.R. § 1.111, was filed on May 20, 2002 in response to a non-final Office Action dated February 20, 2002. In the non-final Office Action, the Examiner considered the Appellant's arguments for claims 1-3, and 27-30, but reiterated his rejection and objection of the claims. No amendments were made to the claims.

A Response, in accordance with 37 C.F.R. § 1.116, was filed July 24, 2002 in response to a final Office Action dated May 24, 2002. In the final Office Action, the Examiner considered the Appellant's arguments, but reiterated his rejection of claims 1-2 and 27-30 and objection to claim 3. No amendments were made to the claims.

The Examiner in response thereto, sustained his rejection in an Advisory Action mailed August 1, 2002.

Appellant hereby directly appeals the rejection of claims 1, 2, and 27-30 and the objection to claim 3.

SUMMARY OF INVENTION

Appellant's invention teaches a method and apparatus for increasing the efficiency of scalable shape coding by correlating the coding of the mask of the object between different scales.

Shape or object mask encoding (also known as object-oriented image and video coding) has gained acceptance and is presently being promoted to various multimedia standards, e.g., the MPEG-4 (Moving Picture Experts Group) international standard. However, unlike traditional frame encoding methods, each frame or picture is considered as consisting of one or more flexible objects (objects having arbitrary shapes), that may undergo changes such as translations, rotations, scaling, brightness and color variations and the like. Using shape or object mask encoding, functionalities are not only provided at the frame level, but also at the object level.

One functionality is scalability, i.e., providing an image at different spatial resolutions. In general, shape encoding starts by segmenting an image frame into a plurality of objects or video object planes (VOPs), e.g., a speaker in an image is one object and the background is a second object. The resulting "shape information" can be represented as a "binary mask". A mask can be broadly defined as the information that defines the shape of an object or pixels associated with an object. Since the object mask is tracked and encoded into the bitstream, it is possible to provide various functionalities based on the object. (For example, see Appellant's specification at page 1, lines 15-33).

More specifically, the shape information or object mask is used to indicate the arbitrary shape of an image or video object and the region in which the texture of this object needs to be coded. The binary shape information provides an object mask with only two values: transparent or opaque (where transparent means the corresponding pixel is outside of an object and opaque means the corresponding pixel is within the object). FIG. 1(a) shows such an arbitrary shaped object 100 and FIG. 1(b) shows the corresponding binary object mask 110 that identifies the shape and texture region of the object. Although the arbitrary shaped object 100 contains specific texture information, illustrated by the different gray-scale shading, such specific texture information is not captured by the object mask. Only the shape information and whether a pixel is within or without an object are provided by the object mask.

When scalability is required, the mask (i.e., shape of the object) is typically decomposed into a plurality of different spatial resolutions (levels of resolution), such that the encoder will

also encode the mask at different spatial resolutions into the encoded bitstream. However, since numerous decompositions methods are available, the encoding efficiency of the encoder varies depending on the decomposition method that is employed. Additionally, if the decomposition method is modified, it is often necessary or desirable to also alter the mask encoding method to better match the decomposition method, thereby increasing overall coding efficiency. Unfortunately, such modification to the encoder is costly, complex, and time consuming. (For example, see Appellant's specification at page 2, lines 1-24).

To address the above-identified criticality, in the present invention, a new generic spatially-scalable shape coding method is disclosed that is independent of the mask decomposition scheme. More specifically, with reference to Appellant's Fig. 10, a full-resolution image frame having at least one object is initially segmented into a plurality of blocks or regions. For the purpose of mask generation, each block is assigned a mode or symbol to indicate whether the block is "opaque", "transparent" or "border". The modes for the entire mask are then encoded into the bitstream.

Next, the method decomposes the "top level" or full-resolution mask into a plurality of layers or mask levels <u>of different spatial resolutions</u> using any shape or mask decomposition method, *e.g.*, any of the decomposition methods as discussed in Appellant's FIGs. 2-6. The lowest mask layer, *i.e.*, "base mask layer", is then encoded into the bitstream.

Next, the method hierarchically and contextually encodes mask layers that are above the base mask layer by using information from an immediate lower mask layer. Namely, each layer above the base mask layer (or "enhancement mask layer") is encoded using information that is derived from a mask layer that is immediately below the present mask layer of interest. In this manner, a generic spatially-scalable shape encoding method is provided that is capable of handling different shape or mask decomposition methods, while maximizing coding efficiency of the encoder.

The present invention is further described in detail with reference to Appellant's FIGs. 7-9 and 11. FIG. 11 illustrates a flowchart of a detailed method 1100 for generic spatially scalable shape or mask encoding that is independent of the shape decomposition method. (For example, see Appellant's specification at page 11, line 31 to page 12, line 27). In essence, Appellant's invention discloses and claims "shape encoding" and more particularly, a specific type of "hierarchical shape encoding."

Additionally, the present invention also discloses several embodiments of contextual coding. In one embodiment, each of these block modes or symbols (M_{ij}) is encoded using context-based arithmetic coding based on the following context:

$$context_0 = S_3 * 27 + S_2 * 9 + S_1 * 3 + S_0,$$

where $context_0$ is the context for the current block mode to be coded, $S_3=M_{(i-1)(j-1)}$, $S_2=M_{(i-1)j}$, $S_1=M_{(i-1)(j+1)}$, $S_0=M_{i(j-1)}$, and i and j are the row index and column index of the blocks, respectively. Namely, using $context_0$ as defined by the above equation to switch a variable length code table to encode the current mode. If any of the context elements are outside the rectangular mask, the ALL-Transparent symbol is used to replace it. To clarify the context elements of the above equation, FIG. 7 illustrates the context construction, where the block 700 with a question mark indicates the block whose mode is to be encoded.

Alternatively, the Appellant's method can encode the mode for the block (M_{ij}) using binary context-based arithmetic coding method. Namely, the 3-ary block mode symbol is first decomposed into binary symbol(s). Binary variables class and type are used to represent a 3-ary block mode. (For example, see Appellant's specification at page 13, lines 11-30). Further embodiments of the Appellant's invention are described in Appellant's specification and FIGs. 20-31. (For example, see Appellant's specification at page 22, line 1 to page 29, line 23).

Claim 1 (the broadest independent claim) is presented below with elements read on FIG. 11 of the drawings, as suggested in MPEP 1206. Specifically, Appellant's claim 1 positively recites (with reference numerals added):

> A method for coding an input object mask, where said input object mask has a plurality of regions, said method comprising the steps of:
>
> (a) assigning at least one symbol to each of the plurality of regions (step 1130);
>
> (b) coding said assigned symbols of the input object mask (step 1140);
>
> (c) decomposing said input object mask into a plurality of object mask layers of different spatial resolution (step 1150);
>
> (d) coding a base object layer of said plurality of object mask layers (step 1160); and
>
> (e) coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer (step 1170).

It should be understood that the above appealed claim may read on other portions of the specification or other figures that are not listed above.

ISSUES

A. Whether claims 1, 2, and 27-30 are patentable under 35 U.S.C. §102(e) over Lee et al. (U.S. Patent No. 5,748,789, issued May 5, 1998) ("Lee et al.").

B. Whether the objection of claim 3 should be withdrawn in view of the patentability of the base claim 1.

GROUPING OF CLAIMS

The rejected claims have been grouped together in the rejection. Appellant urges that each of the rejected claims stands on its own recitation, and is considered to be separately patentable for reasons set forth in more detail infra.

THE REFERENCES

The following reference is relied on by the Examiner:

Inventor	Patent Number	Issue Date
Lee et al.	5,748,789	May 5, 1998

BRIEF DESCRIPTION OF THE REFERENCE

Lee et al. teaches a method for transparent block skipping to reduce coding and decoding operations, thereby reducing the number of bits needed to store a bitstream representing a compressed video sequence. Specifically, Lee et al. only teaches reduction in the "coding overhead and the number of bits needed to code objects in a sequence of video frames by using shape information to identify transparent transformation blocks around an object and then skipping encoding/decoding of these blocks". (See Lee et al., Column 3, lines 8-12).

ARGUMENTS

THE ISSUES UNDER 35 U.S.C. § 102(e)

It is submitted that a reasonable interpretation of the reference teachings as proposed by the Examiner in the Final Office Action would not have resulted in the invention recited in the Appellant's claims.

A.1. 35 U.S.C. § 102(e) - Claim 1

The Examiner rejected claim 1 in Paragraph 6 of the Final Office Action under 35 U.S.C. §102(e) as being unpatentable over Lee et al. ("Lee et al.") (U.S. Patent Number. 5,748,789 issued May 5, 1998). The rejection of claim 1 is respectfully traversed.

Specifically, claim 1 stands rejected under 35 U.S.C. § 102(e), as being unpatentable over Lee et al.

Specifically, the Examiner indicates that:

> Lee et al., in Figures 3, 9-11, 16, 20, 35, and 41-43, discloses the same apparatus and method for coding an input object mask as specified in claims 1, 2, and 27-30 of the present invention, where the input object mask has a plurality of regions (Fig. 16), the method comprising the steps of assigning at least one symbol (Fig. 35) to each of the plurality of regions; coding the assigned symbols of the input object mask contextually in accordance with the neighboring regions (Fig. 38); decomposing the input object mask into a plurality of object mask layers of different spatial resolution (Figs. 16, 35); coding a base object layer of the plurality of object mask layers (i.e. sub-transformation blocks); and coding a next higher layer of the plurality of object mask layers in accordance with information from a lower object mask layer (i.e. macroblocks). See Office Action mailed February 20, 2002, page 3, paragraph 6.

Specifically, Lee et al. completely fails to teach or suggest the novel concept of <u>decomposing an input object mask into a plurality of object mask layers and then coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer</u>. Appellant's independent claim 1 positively recites:

> A method for coding an input object mask, where said input object mask has a plurality of regions, said method comprising the steps of:
> (a) assigning at least one symbol to each of the plurality of regions;
> (b) coding said assigned symbols of the input object mask;
> (c) <u>decomposing said input object mask into a plurality of object mask layers of different spatial resolution;</u>
> (d) coding a base object layer of said plurality of object mask layers; and
> (e) <u>coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer</u>. (emphasis added).

Appellant's invention teaches a method and apparatus for increasing the efficiency of scalable <u>shape coding by correlating the coding of the mask of the object between different scales</u>. Specifically, in the present invention, a new generic spatially-scalable shape coding method is disclosed that is independent of the mask decomposition scheme. More specifically, with reference to Appellant's Fig. 10, a full-resolution image frame having at least one object is

initially segmented into a plurality of blocks or regions. For the purpose of mask generation, each block is assigned a mode or symbol to indicate whether it is "opaque", "transparent" or "border". The modes for the entire mask are then encoded into the bitstream.

Next, the method decomposes the "top level" or full-resolution mask into a plurality of layers or mask levels <u>of different spatial resolution</u> using any shape or mask decomposition methods, e.g., any of the decomposition methods as discussed in Appellant's FIGs. 2-6. The lowest mask layer, i.e., "base mask layer", is then encoded into the bitstream.

Next, the method hierarchically and contextually encodes mask layers that are above the base mask layer by using information from an immediate lower mask layer. Namely, <u>each layer above the base mask layer (or "enhancement mask layer") is encoded using information that is derived from a mask layer that is immediately below the present mask layer of interest</u>. In this manner, a generic spatially-scalable shape encoding method is provided that is capable of handling different shape or mask decomposition methods, while maximizing coding efficiency of the encoder.

In contrast, Lee et al. is completely devoid of any disclosure as to shape encoding in the context of <u>decomposing an input object mask into a plurality of object mask layers and then coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer</u>. In fact, Lee et al. states that:

> In an object-based video encoder or decoder designed according to the invention, shape information is available independent of motion estimation and texture information. As such, <u>the method of the invention can use the shape information to identify transparent transformation blocks and skip texture and possibly motion coding and decoding for these blocks</u>. An encoder employing this method evaluates the shape of an object to determine whether a given block is transparent, i.e. covered by the object. If the block is transparent, the encoder can skip texture coding for inter and intra frame blocks. The encoder can also skip coding of motion estimation data, such as motion vectors or transformation coefficients for inter frame blocks. Similarly, the decoder can use decoded shape information to identify transparent blocks and skip texture or motion decoding for these blocks." (Emphasis added)(See Lee et al., Column 3, lines 13-28).

Thus, Lee et al. addresses a completely different situation than Appellant's invention. Using shape information to skip blocks is <u>**NOT**</u> the same as using shape information to provide scalability. More importantly, Lee et al. is <u>**completely silent**</u> as to Appellant's particular method for encoding an object mask.

First, the Examiner alleged that Lee et al.'s numerical references 380 and 386 correlate to Appellant's plurality of object mask layers. The Examiner is incorrect. Lee et al. states that:

> Function block 378 indicates that the current transformation block (e.g., transformation block 374) is subdivided into, for example, four equal sub-blocks 380a-380d, affine transformations are determined for each of sub-blocks 380a-380d, and a future signal-to-noise ratio is determined with respect to the affine transformations.
>
> Inquiry block 382 represents an inquiry as to whether the future signal-to-noise ratio is greater than the current signal-to-noise ratio by more than a user-selected threshold amount. This inquiry represents a determination that further subdivision of the current transformation block (e.g., transformation block 374) would improve the accuracy of the affine transformations by at least the threshold amount. Whenever the future signal-to-noise ratio is greater than the current signal-to-noise ratio by more than the threshold amount, inquiry block 382 proceeds to function block 384, and otherwise proceeds to function block 388.
>
> Function block 384 indicates that sub-blocks 380a-380d are successively designated the current transformation block, and each are analyzed whether to be further subdivided. For purposes of illustration, sub-block 380a is designated the current transformation and processed according to function block 376 and further sub-divided into sub-blocks 386a-386d. Function block 388 indicates that a next successive transformation block 374' is identified and designated an initial or current transformation block. (See Lee et al., Column 22, line 54 to Column 23, line 15) (emphasis added).

The Board's attention is directed to the fact that Lee et al. is changing the **transformation block size**. Changing the size of transformation blocks does **not** "decompose the input object mask into a plurality of object mask layers of different spatial resolution" as positively claimed by the Appellant. In other words, **the input object mask itself** is decomposed into a plurality of object mask layers **of different spatial resolution**, whereas Lee et al. teaches the use of different transformation block sizes, e.g., as used in performing motion estimation and compensation. Simply selecting a different transformation block size does not generate an object mask layer of a different spatial resolution.

As noted by Lee et al., the selection of a transformation block size is for improving the accuracy of applying the affine transformation. Appellant's claims do not read on a disclosure that employs different transformation block sizes. It is respectfully submitted that Appellant's claims clearly recite Appellant's novel invention and do not read on the Lee et al. reference.

Second, Lee et al. is **completely silent** as to Appellant's particular method for encoding an object mask. Lee et al. contains absolutely no disclosure regarding the encoding of an object mask.

Responsive to Appellant's detailed arguments, the Examiner throughout the entire prosecution of the present application simply stated that Lee et al.'s FIGs. 13, 16, and 35 illustrate Appellant's entire invention. Although Appellant repeatedly requested that the Examiner specifically point out in the specification of the Lee et al. reference text that supports the Examiner's position, the Examiner remained silent. To assist the Board, the Appellant has extracted the relevant portions of the Lee et al. reference pertaining to FIGs. 13, 16 and 35. Specifically, Lee et al. states:

> "FIG. 13 is a simplified representation of a display screen showing the image frame of FIG. 7B for purposes of illustrating the multi-dimensional transformation method of FIG. 12." (See Lee et al. at column 4, lines 44-47).
>
> ...
>
> "FIG. 16 is a simplified fragmentary representation of a display screen showing the image frame of FIG. 7B for purposes of illustrating the transformation block optimization method of FIG. 15." (See Lee et al. at column 4, lines 57-60).
>
> ...
>
> "FIG. 35 illustrates how a frame of video can be divided into the objects in the frame." (See Lee et al. at column 5, lines 54-55).
>
> ...
>
> FIG. 12 is a functional block diagram of a transformation method 350 that includes generating a multi-dimensional transformation between objects in first and second successive image frames and quantitizing the mapping for transmission or storage. The multi-dimensional transformation preferably is utilized in connection with function block 96 of FIG. 3. Transformation method 350 is described with reference to FIG. 7A and FIG. 13, the latter of which like FIG. 7B is a simplified representation of display screen 50 showing image frame 202b in which image feature 204 is rendered as object 204b. (See Lee et al. at column 18, lines 24-34).
>
> ...
>
> FIG. 15 is a functional block diagram of a transformation block optimization method 370 that automatically selects transformation block dimensions that provide a minimal error threshold. Optimization method 370 is described with reference to FIG. 16, which is a simplified representation of display screen 50 showing a portion of image frame 202b with object 204b. (See Lee et al. at column 22, lines 32-38).
>
> ...
>
> As an example of object-based coding, FIG. 35 illustrates a frame of video in terms of the objects 1540-1544 that make up the frame. In this example, the frame 1538 is segmented into 3 objects: a person 1540, a spaceship 1542, and the background with landscape 1544a, tree 1544b, and sky 1544c. For simplicity we refer to the background generally using reference numeral 1544.

FIG. 35 shows the object representing a person 1540 in expanded form to show how this portion of the image is divided into transformation blocks. As part of the object definition process, the encoder computes a bounding rectangle 1546 for the object 1540. To code the object using transformation blocks, the encoder expands the bounding rectangle such that the rectangle is an integer multiple of transformation blocks (1548-1552) in both the vertical and horizontal direction. The transformation blocks 1548-1552 in this example are sometimes referred to as macroblocks. Each macroblock is further divided into sub-transformation blocks, referred to as "blocks."

During the coding process, the encoder codes the shape of the objects (e.g., 1540, 1542) separately from the objects' texture and motion data.

In FIG. 35 for example, the shape of the object representing the person 1540 is represented by a mask, and this mask is coded and decoded separately from the object's texture or motion data.

Since the object 1540 representing the person in video frame 1538 is separated from the other objects in the frame, the region inside the bounding box 1546 is likely to have some transparent macroblocks and blocks. The overhead and number of bits needed to encode the object's texture and motion data can be reduced by using shape to determine which transformation blocks (e.g., macroblocks) and sub-transformation blocks (e.g. blocks) are transparent (i.e. not covered by the object 1540). Once these transparent macroblocks and blocks are identified, the coder and decoder can skip coding for these macroblocks or blocks. Skipping of transparent transformation blocks applies when the entire transformation block is transparent. Skipping of transparent sub-transformation blocks applies to transformation blocks partially covered by an object. A "partially covered" macroblock may include one or more transparent blocks and one or more blocks covered by a portion of an object.

An example of a transparent macroblock is macroblock 1548, which lies entirely outside object 1540. An example of a partially covered macroblock is macroblock 1550, which includes transparent blocks 1554-1558 and partially covered block 1560 covered by a portion of the object 1562.

Before describing skipping of transparent transformation blocks, we describe object-based coding in more detail. This will provide a context for transparent block skipping, which is described in more detail below. (See Lee et al. at column 43, line 28 to column 44, line 13).

Appellant's inclusion of the above sections from Lee et al. (inferred by the Examiner's rejection), is provided so that the Board can evaluate whether there is support for the Examiner's broad application of Lee et al. against Appellant's claims.

Contrary to the Examiner's interpretation of Lee et al., it is Appellant's position that the above recitations from Lee et al. indicate that Lee et al. does **not** teach Appellant's invention.

In view of the foregoing remarks, the Appellant submits that independent claim 1, fully satisfies the requirements of 35 U.S.C. § 102(e) and is patentable thereunder.

A.2. 35 U.S.C. § 102(e) - Claim 2

The Examiner rejected claim 2 in Paragraph 6 of the Final Office Action under 35 U.S.C. §102(e) as being unpatentable over Lee et al. The rejection of claim 2 is respectfully traversed.

Specifically, claim 2 stands rejected under 35 U.S.C. § 102(e), as being unpatentable over Lee et al. Appellant's dependent claim 2 positively recites:

"The method of claim 1, wherein said coding step (b) codes said assigned symbols contextually in accordance with neighboring regions."

Dependent claim 2 depends directly from claim 1 and recites additional features therefore. Since Lee et al. fails to teach or suggest claim 1 of Appellant's invention, Appellant respectfully submits that dependent claim 2 is also not anticipated by the teachings of Lee et al. and, as such, fully satisfies the requirements of U.S.C. § 102(e) and is patentable thereunder.

In addition, dependent claim 2 further defines the coding step of independent method claim 1. This feature recites an embodiment of Appellant's invention that utilizes contextual coding. Contextual coding codes assigned symbols by referring to neighboring regions to determine the coding of the current block. Lee et al. does not utilize contextual coding.

As such, Appellant respectfully submits that claim 2 is not anticipated by the teachings of Lee et al. and, as such, fully satisfies the requirements of U.S.C. §102 and is patentable thereunder.

A.3. 35 U.S.C. § 102(e) - Claim 27

The Examiner rejected claim 27 in Paragraph 6 of the Final Office Action under 35 U.S.C. §102(e) as being unpatentable over Lee et al. The rejection of claim 27 is respectfully traversed.

Appellant respectfully submits that those arguments made with respect to the patentability of claim 1 (subsection "A.1" of the "Arguments" section herein) is also applicable with respect to the patentability of claim 27.

However, additional arguments exist that further distinguish claim 27 from Lee et al. For example, Lee et al. is completely silent regarding a computer-readable medium having stored

thereon a method for encoding an object mask. The present invention, as claimed in the computer readable medium claim 27, may be practiced independently of method claim 1. Appellant's independent claim 27 recites:

> A computer-readable medium having stored thereon a plurality of instructions, the plurality of instructions including instructions which, when executed by a processor, cause the processor to perform the steps of a method for coding an input object mask, where said input object mask has a plurality of regions, said method comprising the steps of:
> (a) assigning at least one symbol to each of the plurality of regions;
> (b) coding said assigned symbols of the input object mask;
> (c) decomposing said input object mask into a plurality of object mask layers of different spatial resolution;
> (d) coding a base object layer of said plurality of object mask layers; and
> (e) coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer. (emphasis added).

In view of the foregoing remarks, the Appellant submits that independent claim 27, fully satisfies the requirements of 35 U.S.C. § 102(e) and is patentable thereunder.

A.4. 35 U.S.C. § 102(e) - Claim 28

The Examiner rejected claim 28 in Paragraph 6 of the Final Office Action under 35 U.S.C. §102(e) as being unpatentable over Lee et al. The rejection of claim 28 is respectfully traversed.

Appellant respectfully submits that those arguments made with respect to the patentability of claim 2 (subsections "A.1" to "A.2" of the "Arguments" section herein) is also applicable with respect to the patentability of claim 28.

However, additional arguments exist that further distinguish claim 28 from Lee et al. For example, Lee et al. is completely silent regarding a computer-readable medium having stored thereon a method for encoding an object mask. The present invention, as claimed in the computer readable medium claim 28, may be practiced independently of method claim 2. Appellant's dependent claim 28 positively recites:

"The computer-readable medium of claim 27, wherein said coding step (b) codes said assigned symbols contextually in accordance with neighboring regions."

Dependent claim 28 depends directly from claim 27 and recites additional features therefore. Since Lee et al. fails to teach or suggest claim 27 of Appellant's invention, Appellant respectfully submits that dependent claim 28 is also not anticipated by the teachings of Lee et al. and, as such, fully satisfies the requirements of U.S.C. § 102(e) and is patentable thereunder.

In addition, dependent claim 28 further defines the coding step of independent claim 27 directed to a computer readable medium. Claim 28 recites an embodiment of Appellant's invention that utilizes contextual coding. Contextual coding codes assigned symbols by referring to neighboring regions to determine the coding of the current block. <u>Lee et al. does not utilize contextual coding.</u>

As such, Appellant respectfully submits that claim 28 is not anticipated by the teachings of Lee et al. and, as such, fully satisfies the requirements of U.S.C. §102 and is patentable thereunder.

A.5. <u>35 U.S.C. § 102(e) - Claim 29</u>

The Examiner rejected claim 29 in Paragraph 6 of the Final Office Action under 35 U.S.C. §102(e) as being unpatentable over Lee et al. The rejection of claim 29 is respectfully traversed.

Appellant respectfully submits that those arguments made with respect to the patentability of claim 1 (subsection "A.1" of the "Arguments" section herein) are also applicable with respect to the patentability of claim 29.

However, additional arguments exist that further distinguish claim 29 from Lee et al. For example, Lee et al. is completely silent regarding an apparatus for encoding an object mask. Conceivably, Appellant's invention as embodied in apparatus claim 29 can be practiced independent of computer readable medium claim 27 or method claim 1. Appellant's independent claim 29 recites:

> An apparatus for coding an input object mask, where said input object mask has a plurality of regions, said apparatus comprising:
> means for assigning at least one symbol to each of the plurality of regions;
> a first means for coding said assigned symbols of the input object mask;
> <u>means for decomposing said input object mask into a plurality of object mask layers of different spatial resolution;</u>

> a second means for coding a base object layer of said plurality of object mask layers; and
> a third means for coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer.
> (emphasis added).

In view of the foregoing remarks, the Appellant submits that independent claim 29, fully satisfies the requirements of 35 U.S.C. § 102(e) and is patentable thereunder.

A.6. 35 U.S.C. § 102(e) - Claim 30

The Examiner rejected claim 30 in Paragraph 6 of the Final Office Action under 35 U.S.C. §102(e) as being unpatentable over Lee et al. The rejection of claim 30 is respectfully traversed.

Appellant respectfully submits that those arguments made with respect to the patentability of claim 2 (subsections "A.1" to "A.2" of the "Arguments" section herein) are also applicable with respect to the patentability of claim 30.

However, additional arguments exist that further distinguish claim 30 from Lee et al. For example, Lee et al. is completely silent regarding an apparatus for encoding an object mask. Conceivably, Appellant's invention as embodied in apparatus claim 30 can be practiced independent of computer readable medium claim 28 or method claim 2. Appellant's dependent claim 30 positively recites:

"The apparatus of claim 29, wherein said first coding means codes said assigned symbols contextually in accordance with neighboring regions."

Dependent claim 30 depends directly from claim 29 and recites additional features therefore. Since Lee et al. fails to teach or suggest claim 29 of Appellant's invention, Appellant respectfully submits that dependent claim 30 is also not anticipated by the teachings of Lee et al. and, as such, fully satisfies the requirements of U.S.C. § 102(e) and is patentable thereunder.

In addition, dependent claim 30 further defines the coding step/means of independent apparatus claim 29. Claim 30 recites an embodiment of Appellant's invention that utilizes contextual coding. Contextual coding codes assigned symbols by referring to neighboring regions to determine the coding of the current block. Lee et al. does not utilize contextual coding.

As such, Appellant respectfully submits that claim 30 is not anticipated by the teachings of Lee et al. and, as such, fully satisfies the requirements of U.S.C. §102 and is patentable thereunder.

B. Allowable Subject Matter -- Claim 3

In view of the remarks above, the Appellant believes that the objection for claim 3, which is dependent upon a rejected claim 1, is thereby overcome and respectfully requests that the objection be withdrawn.

CONCLUSIONS

For the reasons advanced above, Appellant respectfully urges that the rejections of claims 1, 2, 3 and 27-30 as being anticipated under 35 U.S.C. § 102(e) are improper. Reversal of the rejections in this appeal is respectfully requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. If necessary, please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 20-0782 and please credit any excess fees to such deposit account.

Respectfully submitted,

1/28/03

Kin-Wah Tong, Esq.
Attorney for the Appellant
Reg. No. 39,400

APPENDIX

CLAIMS UNDER APPEAL IN SN 09/312,797

1. A method for coding an input object mask, where said input object mask has a plurality of regions, said method comprising the steps of:

(a) assigning at least one symbol to each of the plurality of regions;

(b) coding said assigned symbols of the input object mask;

(c) decomposing said input object mask into a plurality of object mask layers of different spatial resolution;

(d) coding a base object layer of said plurality of object mask layers; and

(e) coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer.

2. The method of claim 1, wherein said coding step (b) codes said assigned symbols contextually in accordance with neighboring regions.

3. The method of claim 2, wherein said coding step (b) coding said assigned symbols contextually in accordance with:

$$context_0 = S_3 * 27 + S_2 * 9 + S_1 * 3 + S_0,$$

where $context_0$ is a context for an assigned symbol for a current region, M_{ij}, to be coded, i and j are respectively row index and column index, and wherein said neighboring regions are defined as $S_3 = M_{(i-1)(j-1)}$, $S_2 = M_{(i-1)j}$, $S_1 = M_{(i-1)(j+1)}$, and $S_0 = M_{i(j-1)}$.

27. A computer-readable medium having stored thereon a plurality of instructions, the plurality of instructions including instructions which, when executed by a processor, cause the processor to perform the steps of a method for coding an input object mask,

where said input object mask has a plurality of regions, said method comprising the steps of:

(a) assigning at least one symbol to each of the plurality of regions;

(b) coding said assigned symbols of the input object mask;

(c) decomposing said input object mask into a plurality of object mask layers of different spatial resolution;

(d) coding a base object layer of said plurality of object mask layers; and

(e) coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer.

28. The computer-readable medium of claim 27, wherein said coding step (b) codes said assigned symbols contextually in accordance with neighboring regions.

29. An apparatus for coding an input object mask, where said input object mask has a plurality of regions, said apparatus comprising:

means for assigning at least one symbol to each of the plurality of regions;

a first means for coding said assigned symbols of the input object mask;

means for decomposing said input object mask into a plurality of object mask layers of different spatial resolution;

a second means for coding a base object layer of said plurality of object mask layers; and

a third means for coding a next higher layer of said plurality of object mask layers in accordance with information from a lower object mask layer.

30. The apparatus of claim 29, wherein said first coding means codes said assigned symbols contextually in accordance with neighboring regions.